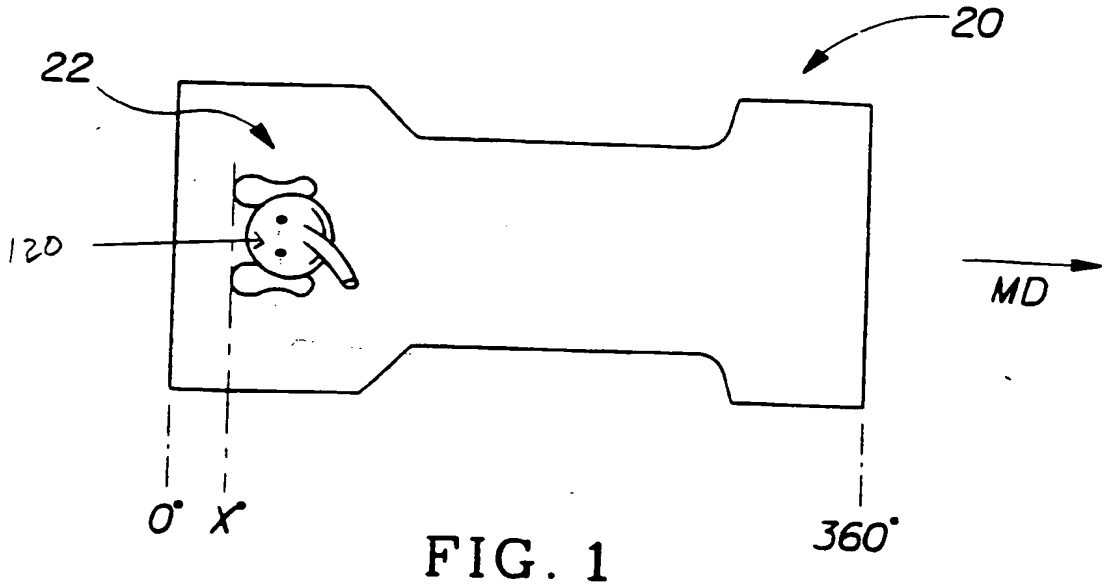


FIG. 1

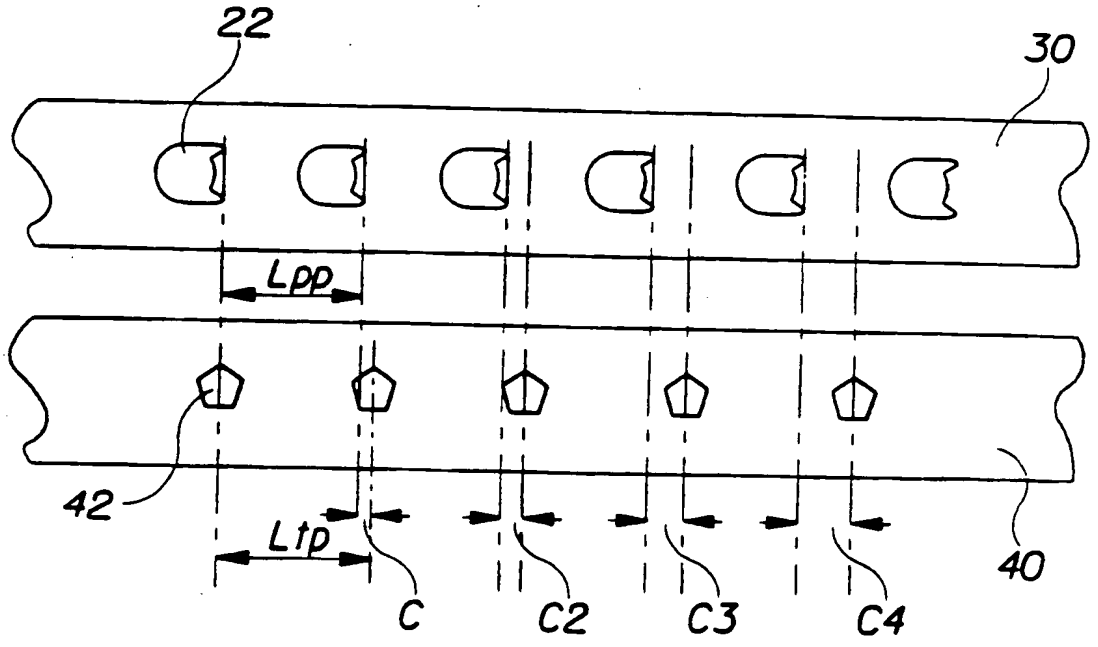


FIG. 2A

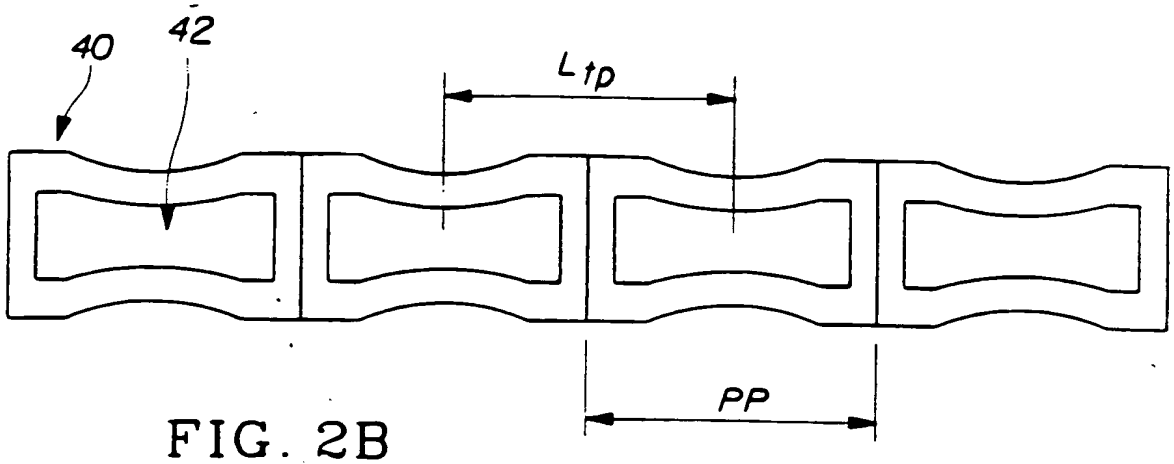
40
42
Ltp
PP

FIG. 2B

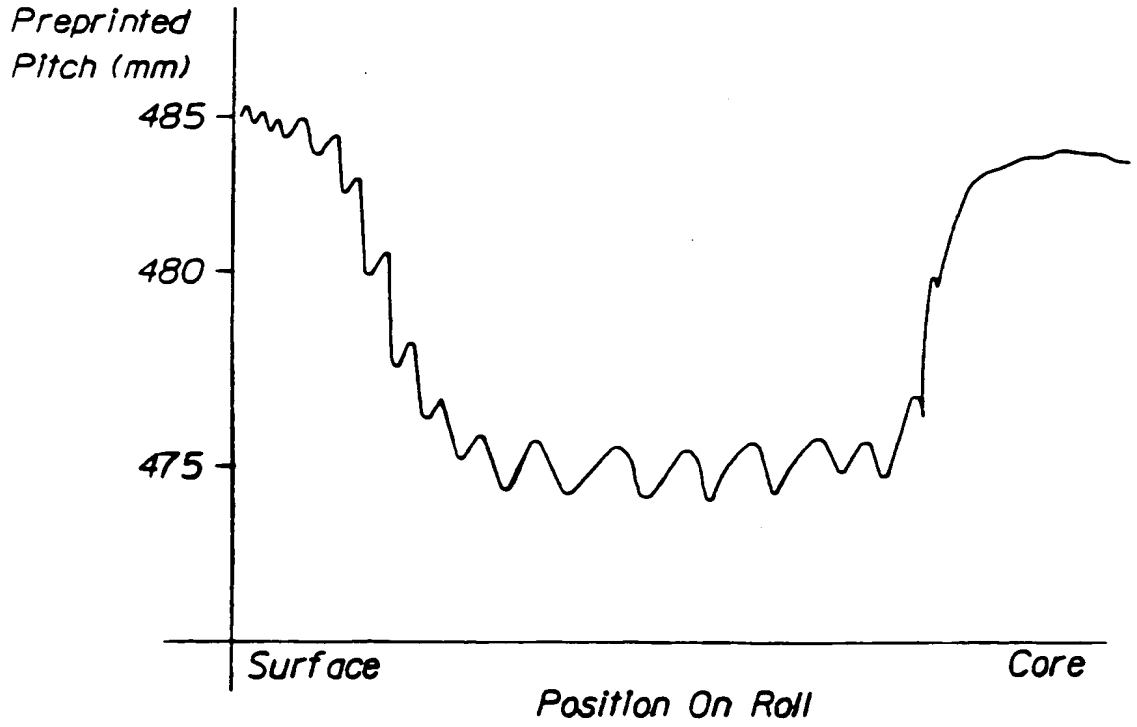
Preprinted
Pitch (mm)
485
480
475
Surface
Core
Position On Roll

FIG. 3

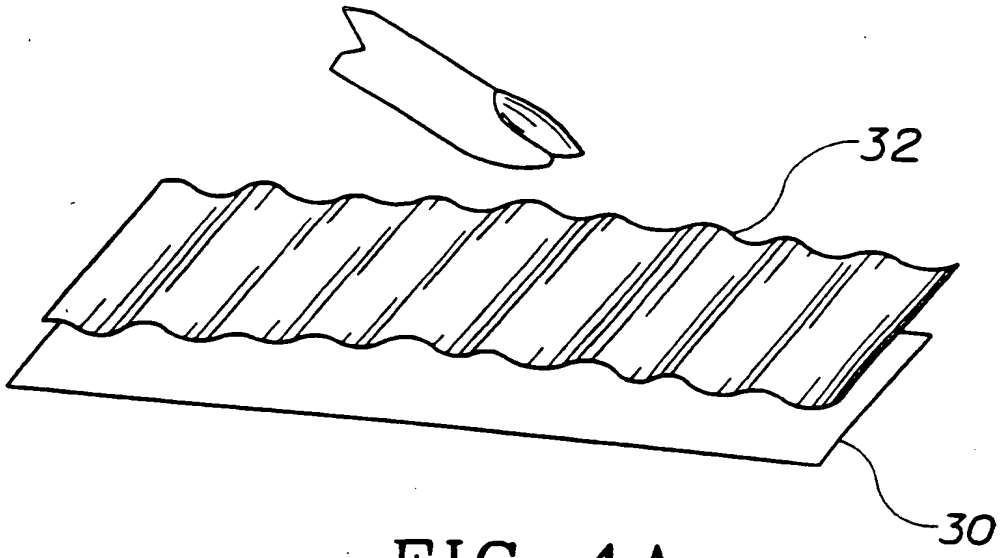


FIG. 4A

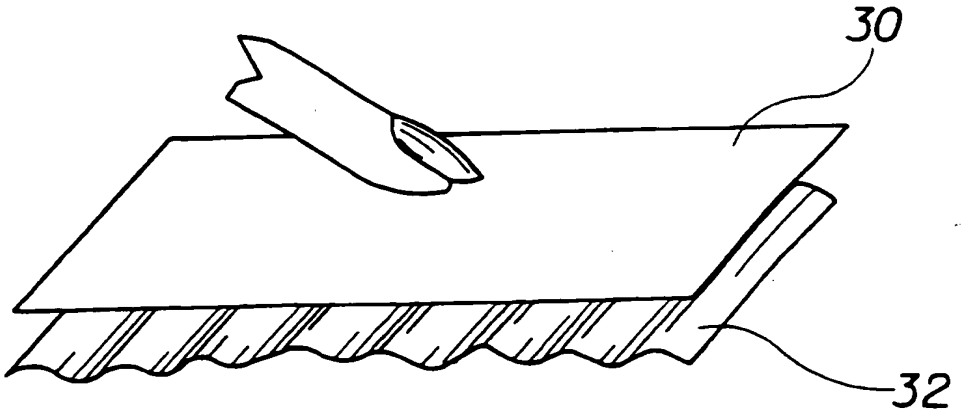


FIG. 4B

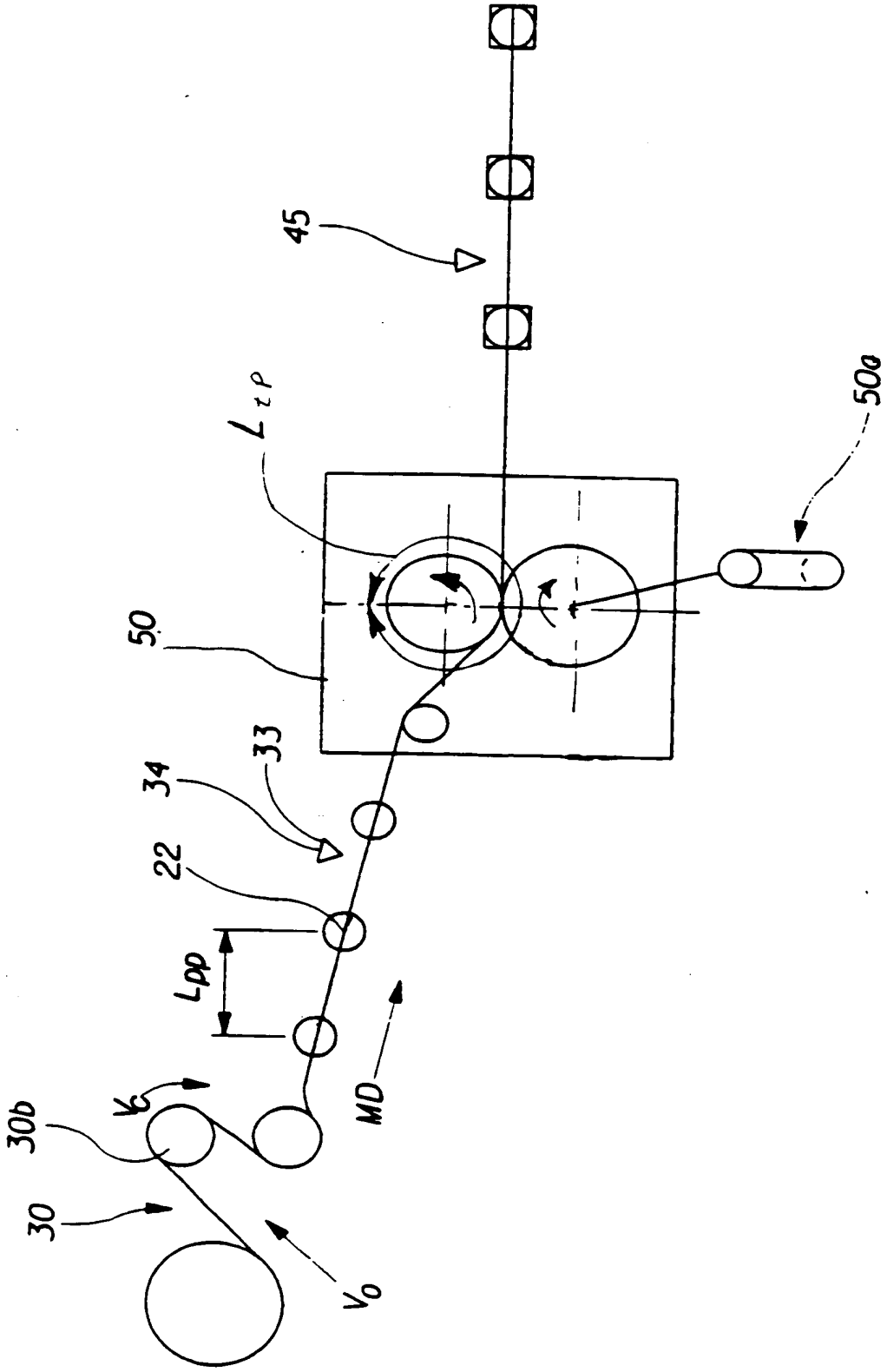


FIG. 5A

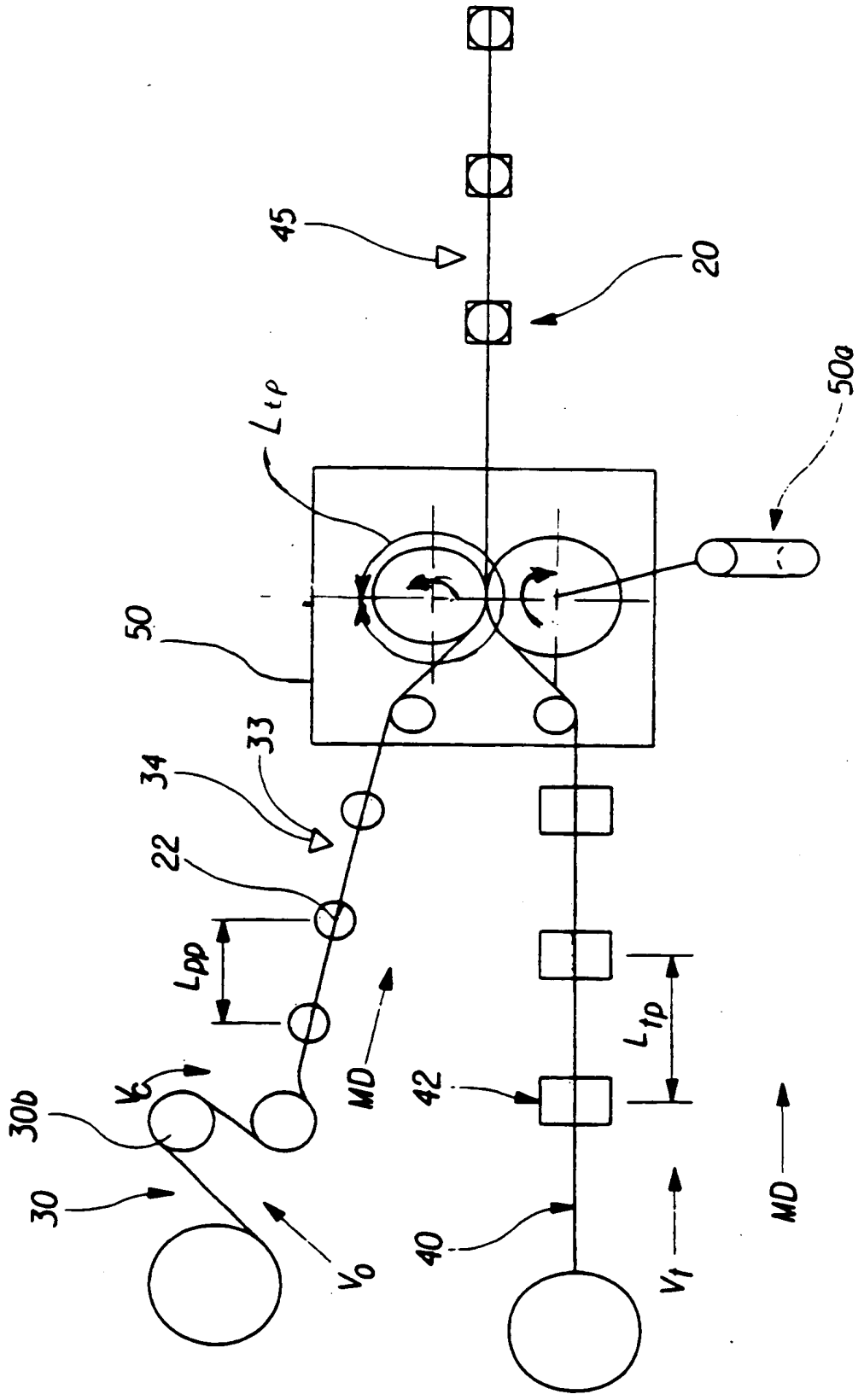


FIG. 5B

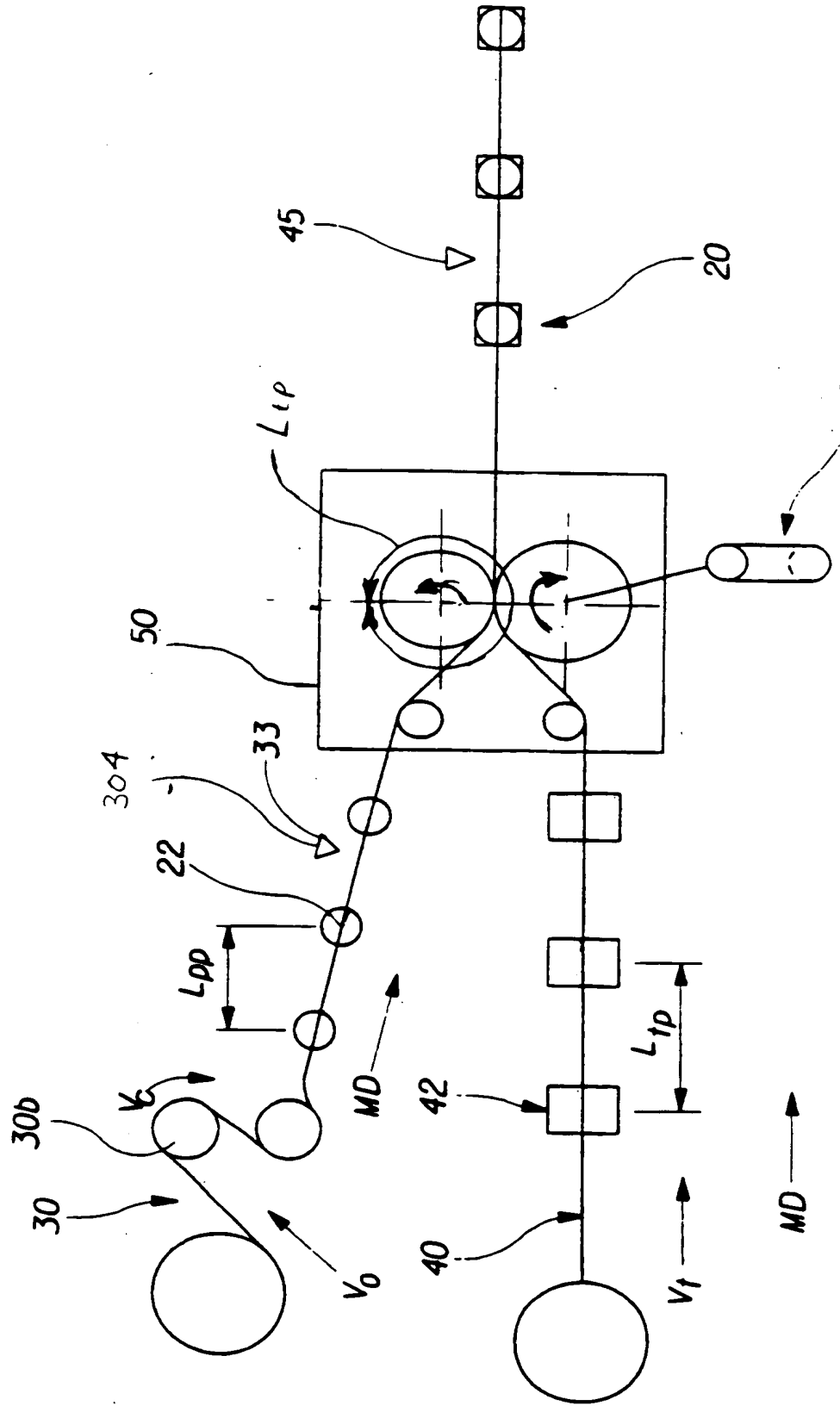


FIG. 5C

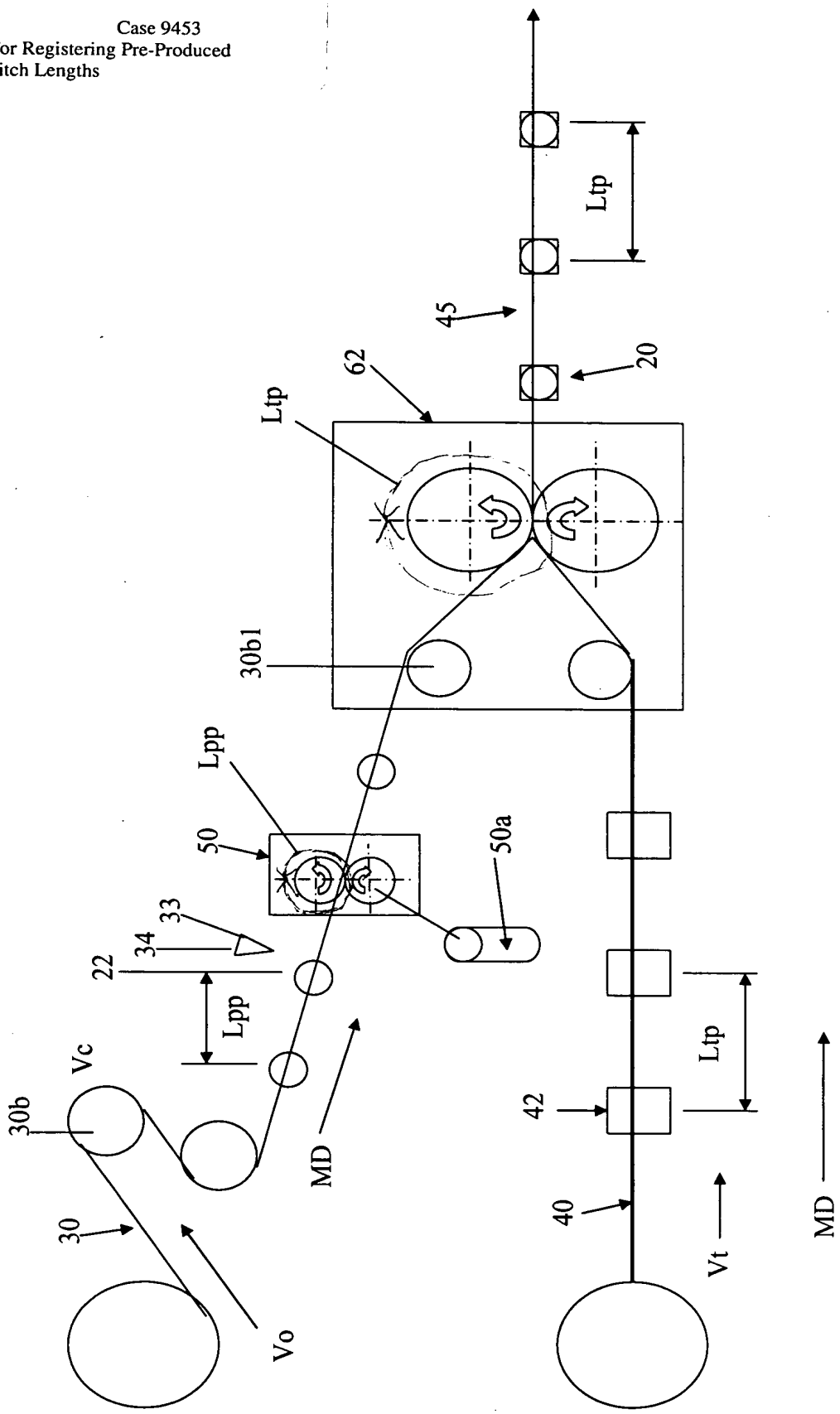
Ltp
45
62
20
Ltp
30b1
Lpp
50
50a
33
34
22
Lpp
Vc
30b
MD
30
Vo
42
Ltp
40
Vt
MD

FIG. 5D

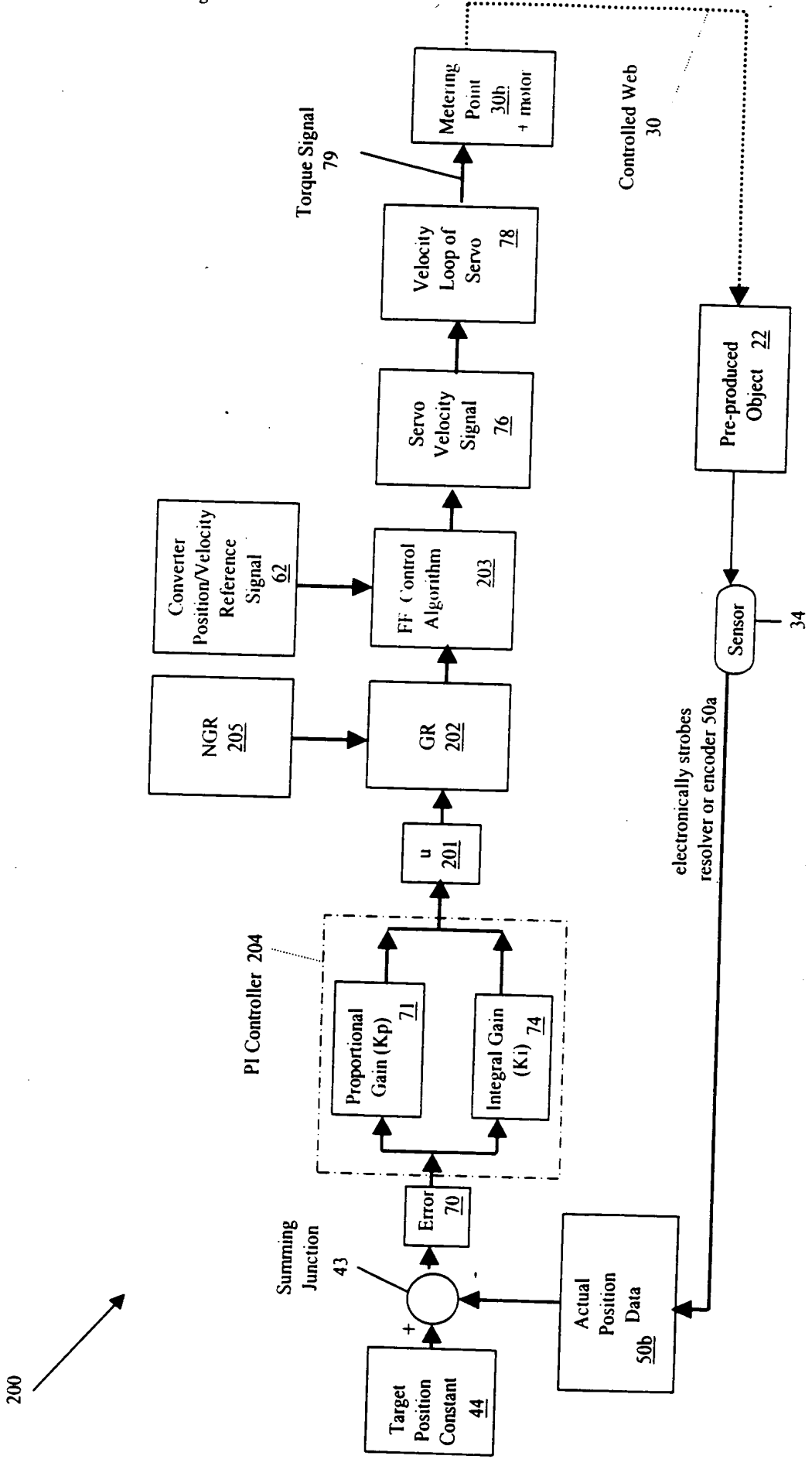
200
Target Position Constant 44
Summing Junction 43
+
-
Error 70
PI Controller 204
Proportional Gain (Kp) 71
Integral Gain (Ki) 74
u 201
GR 202
NGR 205
Converter Position/Velocity Reference Signal 62
FF Control Algorithm 203
Servo Velocity Signal 76
Velocity Loop of Servo 78
Torque Signal 79
Metering Point 30b + motor
Controlled Web 30
Pre-produced Object 22
Sensor 34
electronically strobes resolver or encoder 50a
Actual Position Data 50b
LEGEND:
GR - Gear Ratio
FF - FeedFoward
NGR - Nominal Gear Ratio
u - Correction Signal
PI - Proportional Integral

FIG. 6A

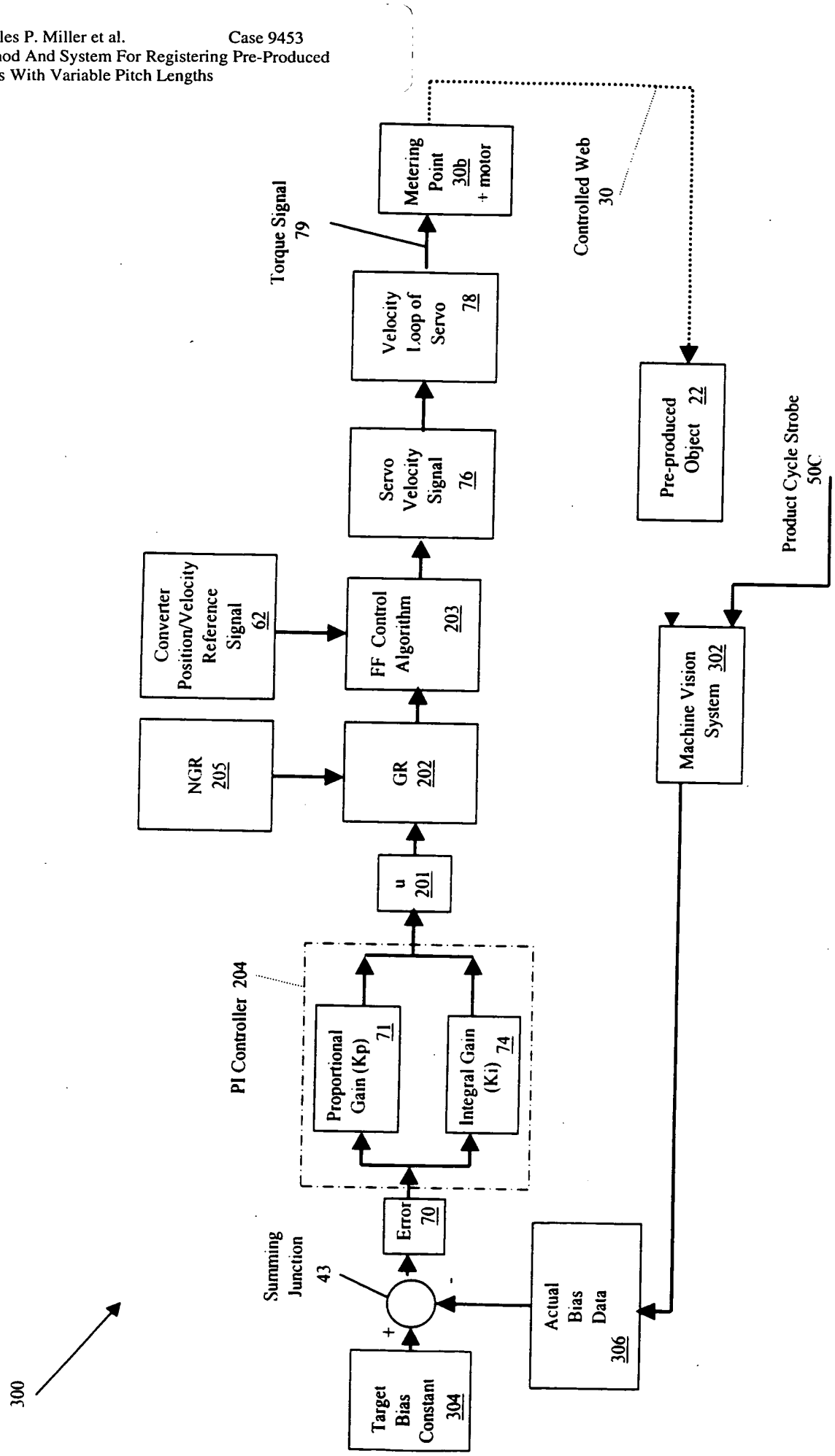
300
Target Bias Constant 304
Summing Junction 43
+
-
Actual Bias Data 306
Error 70
PI Controller 204
Proportional Gain (Kp) 71
Integral Gain (Ki) 74
u 201
NGR 205
GR 202
Converter Position/Velocity Reference Signal 62
FF Control Algorithm 203
Servo Velocity Signal 76
Velocity Loop of Servo 78
Torque Signal 79
Metering Point 30b + motor
Controlled Web 30
Pre-produced Object 22
Machine Vision System 302
Product Cycle Strobe 50C
LEGEND:
GR -- Gear Ratio
FF -- Feedfoward
NGR Nominal Gear Ratio
u - Correction Signal
PI - Proportional Integral

FIG. 6B

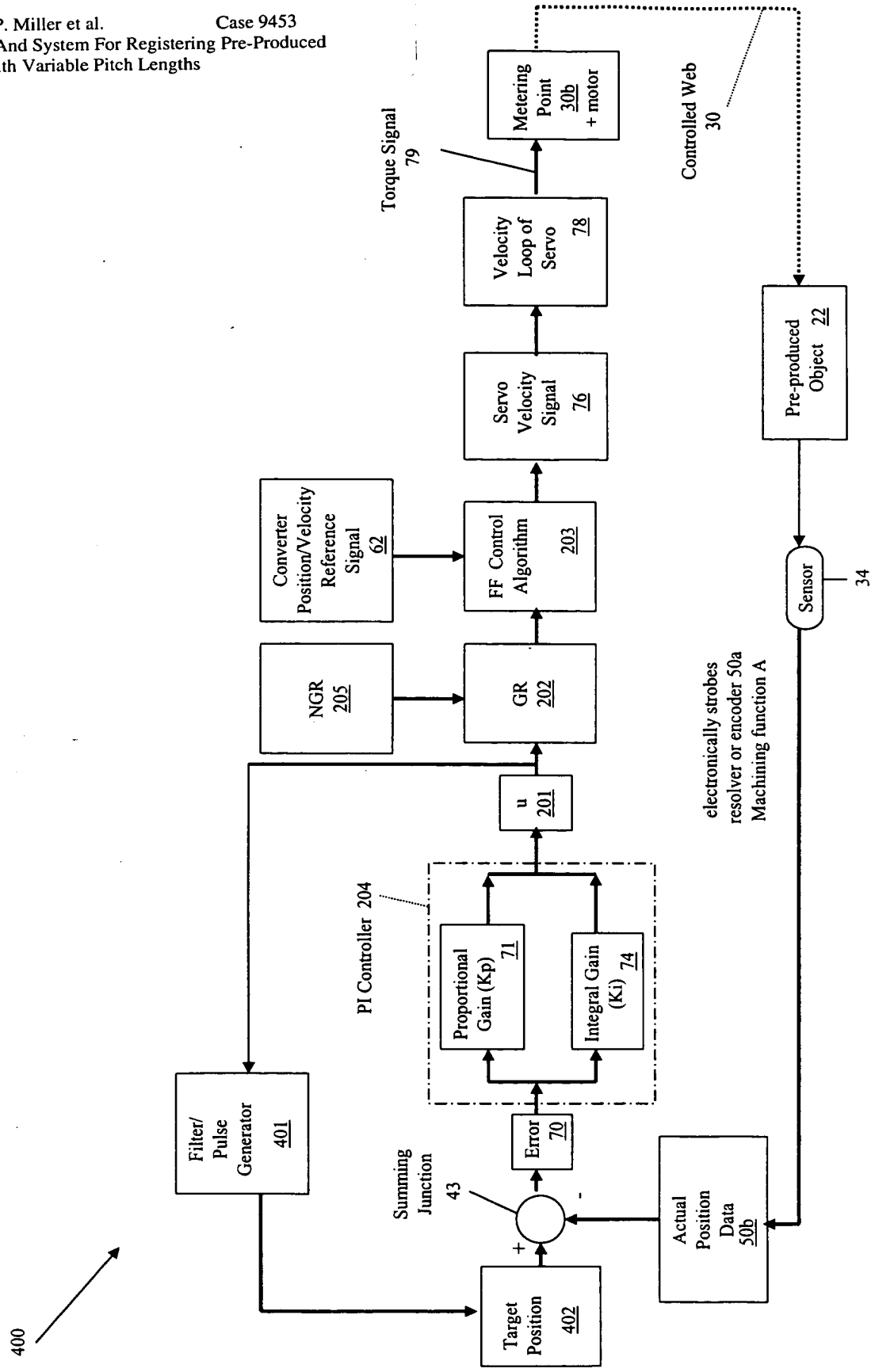
400
Target Position 402
Filter/ Pulse Generator 401
Summing Junction 43
+
-
Error 70
PI Controller 204
Proportional Gain (Kp) 71
Integral Gain (Ki) 74
u 201
NGR 205
GR 202
Converter Position/Velocity Reference Signal 62
FF Control Algorithm 203
Servo Velocity Signal 76
Velocity Loop of Servo 78
Torque Signal 79
Metering Point 30b + motor
Controlled Web 30
Pre-produced Object 22
Sensor 34
electronically strobes resolver or encoder 50a Machining function A
Actual Position Data 50b
LEGEND:
GR – Gear Ratio
FF -- FeedFoward
NGR – Nominal Gear Ratio
u - Correction Signal
PI - Proportional Integral

FIG. 6C

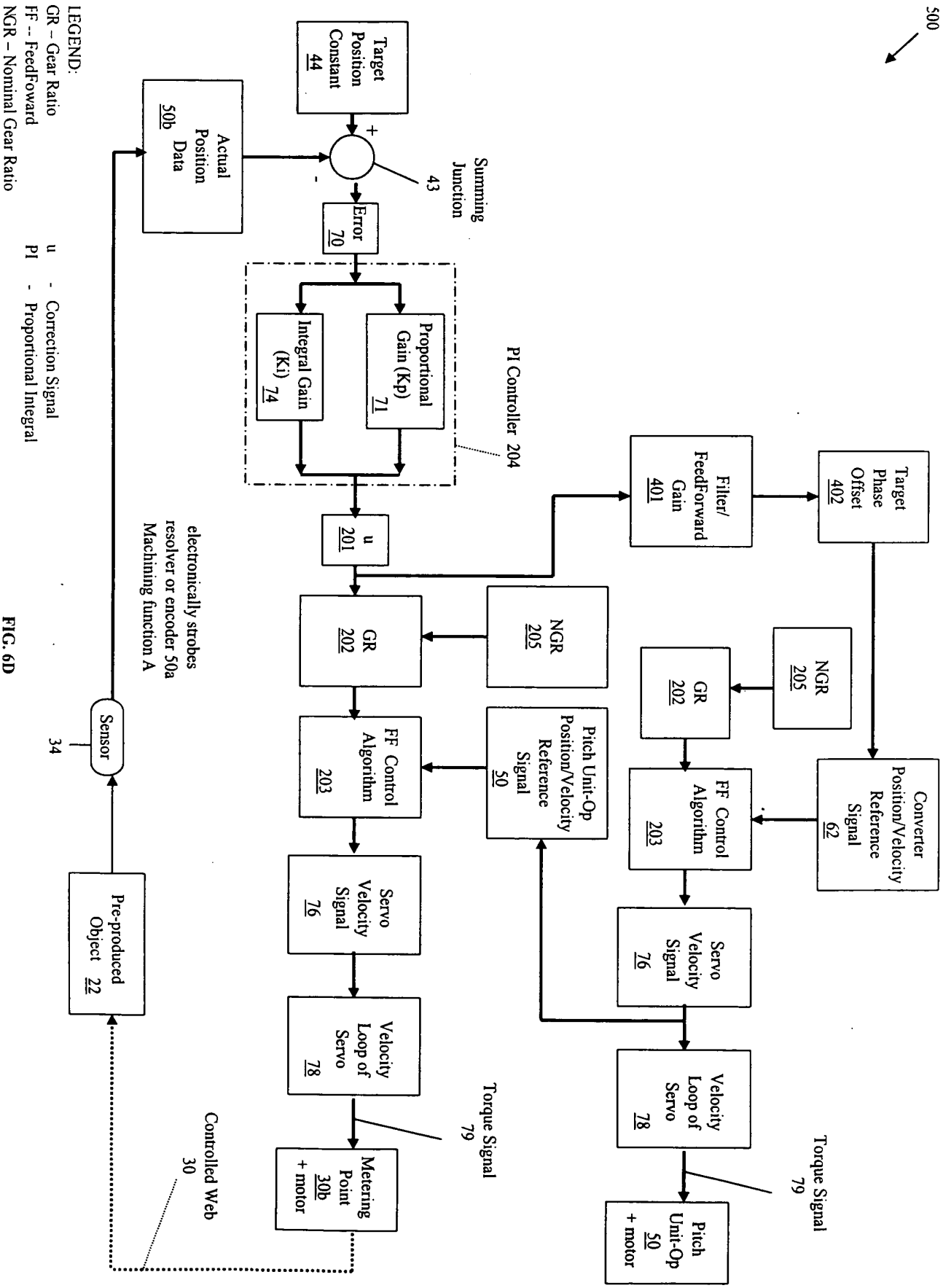
500
Target Position Constant 44
Actual Position 50b Data
Summing Junction 43
Error 70
PI Controller 204
Proportional Gain (Kp) 71
Integral Gain (Ki) 74
u 201
Filter/ FeedForward Gain 401
Target Phase Offset 402
NGR 205
GR 202
FF Control Algorithm 203
Converter Position/Velocity Reference Signal 62
Pitch Unit-Op Position/Velocity Reference Signal 50
Servo Velocity Signal 76
Velocity Loop of Servo 78
Torque Signal 79
Pitch Unit-Op 50 + motor
Metering Point 30b + motor
Controlled Web 30
Pre-produced Object 22
Sensor 34
electronically strobes resolver or encoder 50a
Machining function A
LEGEND:
GR – Gear Ratio
FF -- FeedFoward
NGR – Nominal Gear Ratio
u - Correction Signal
PI - Proportional Integral

FIG. 6D

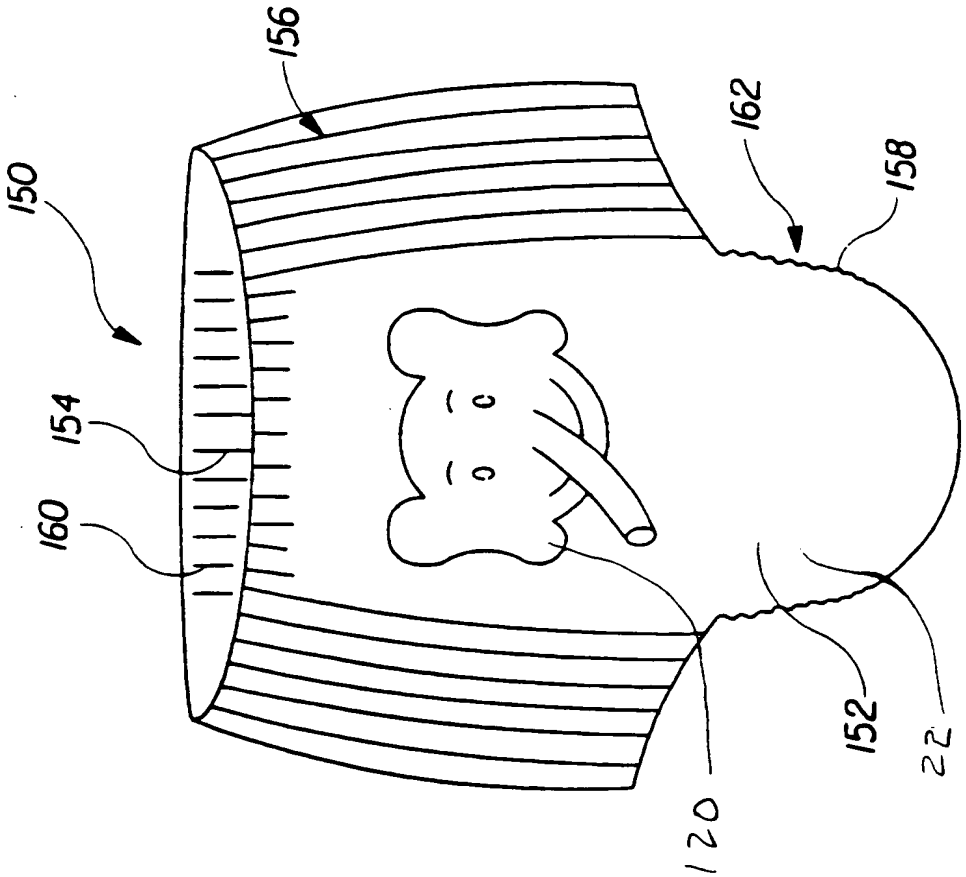


FIG. 7

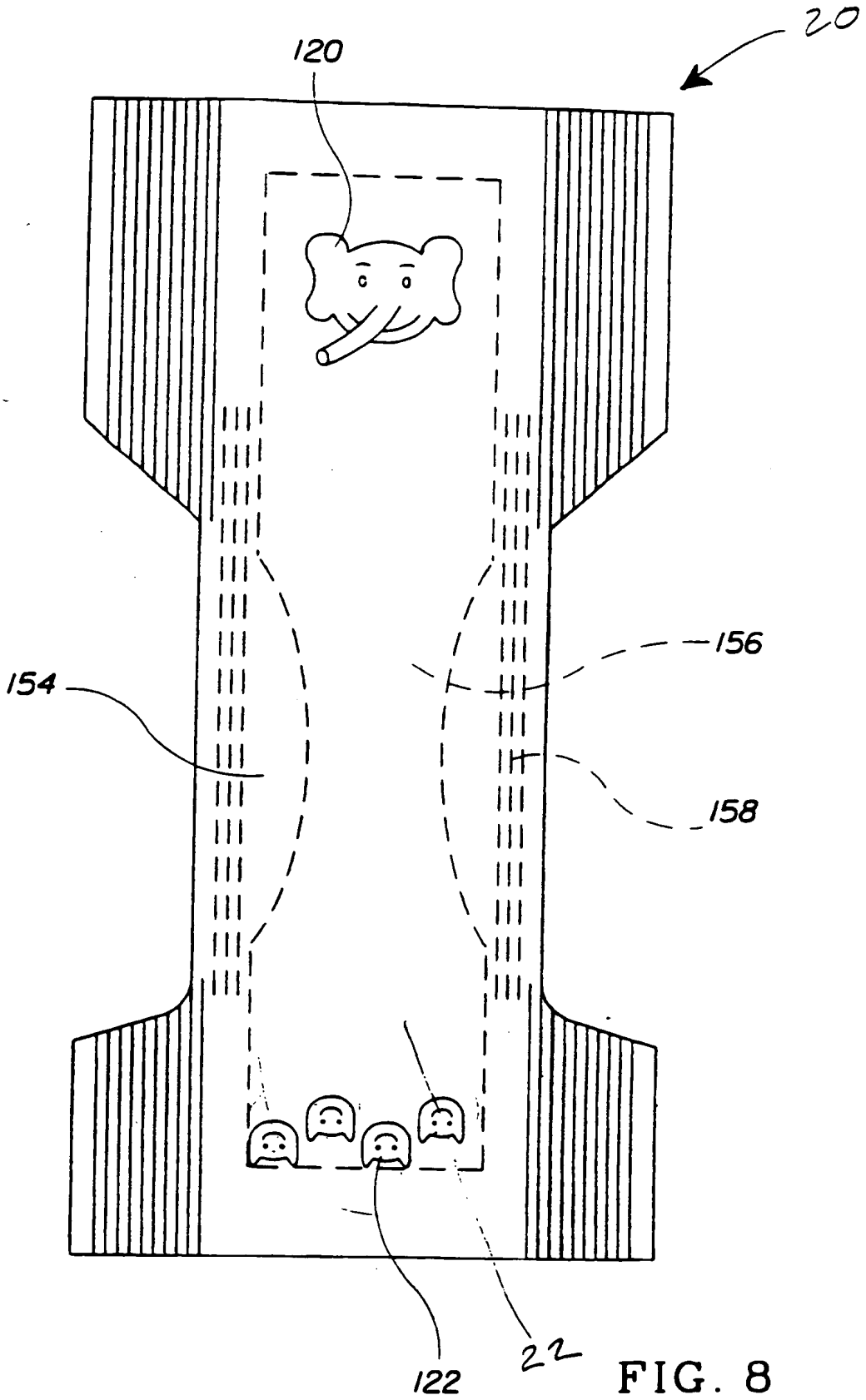


FIG. 8

FIG 9A

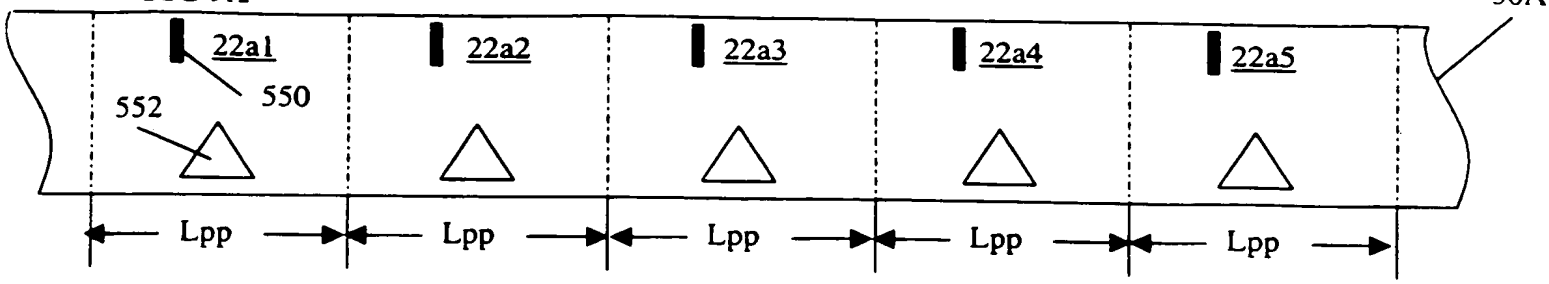


FIG 9B

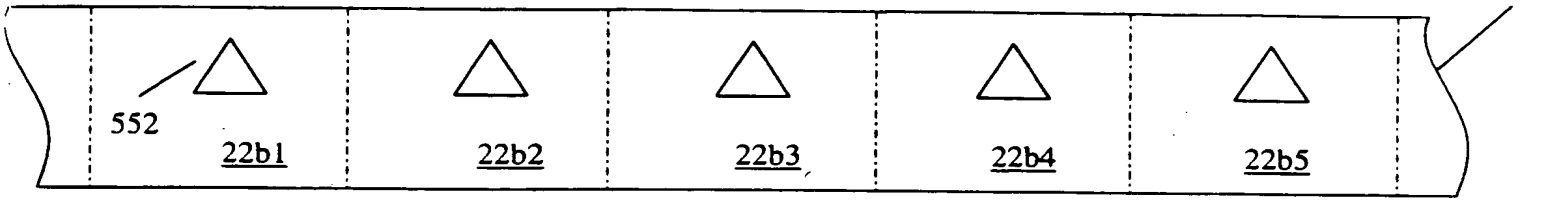


FIG 9C

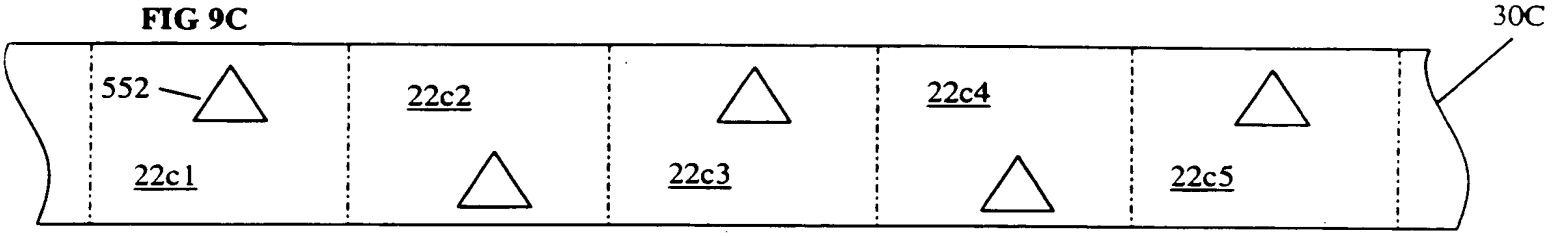


FIG 9D

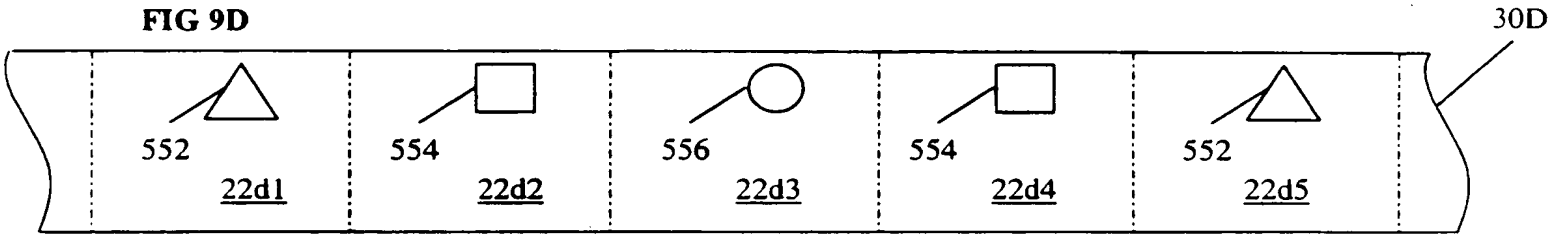


FIG 9E

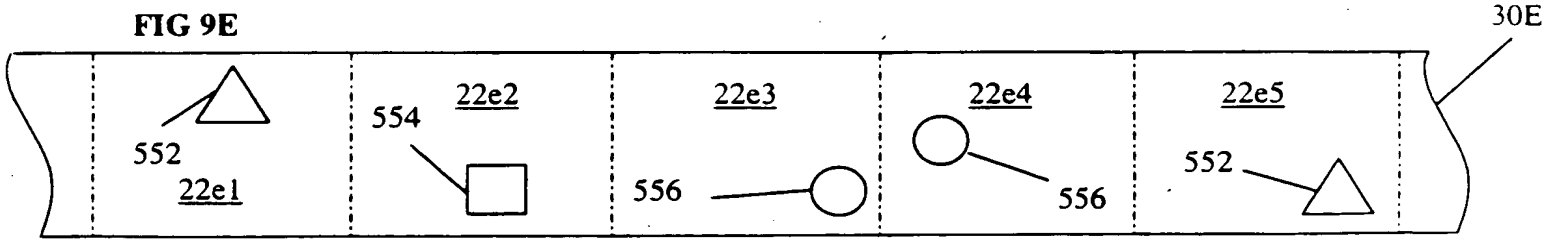


FIG. 9

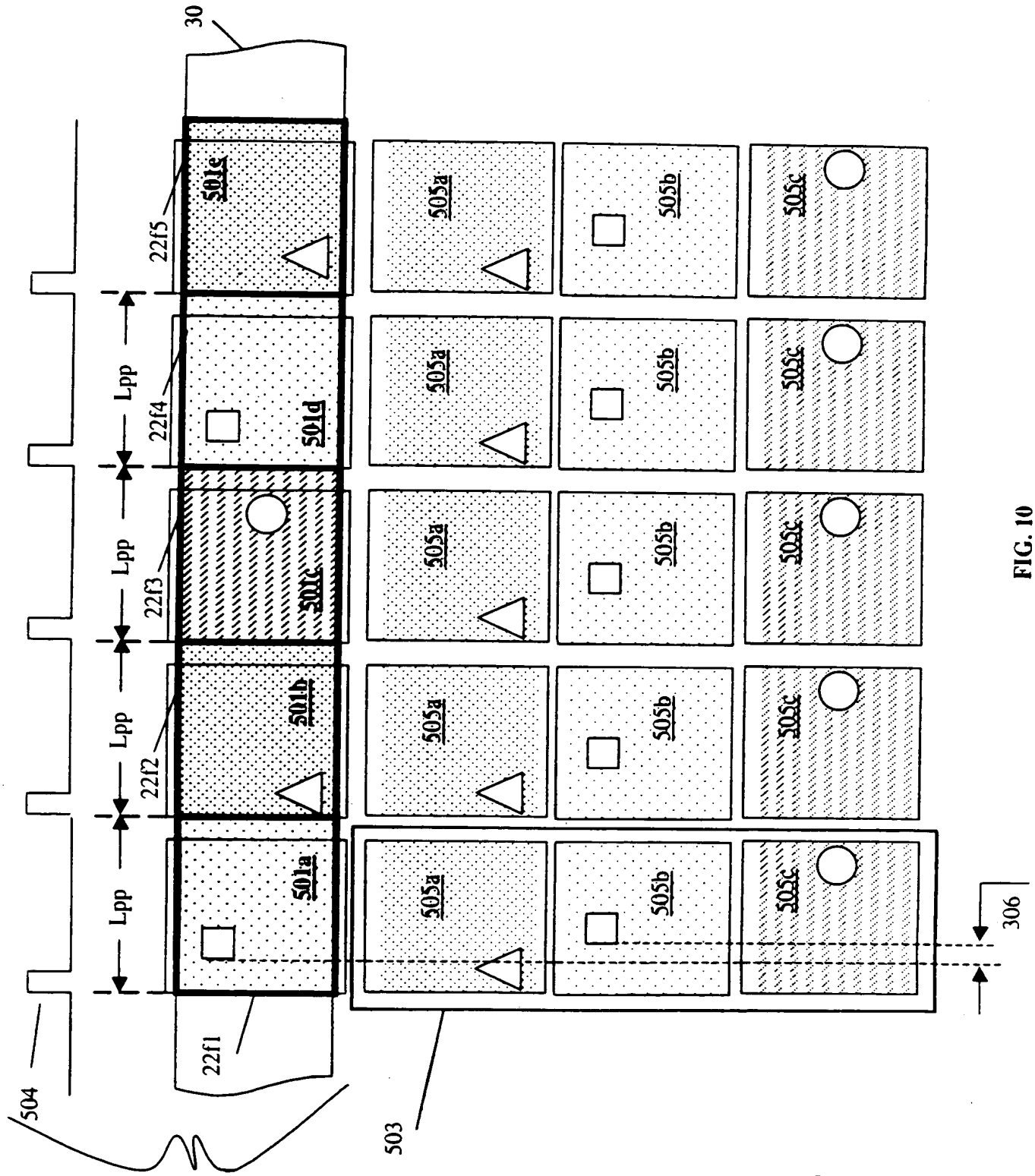


FIG. 10

FIG 10A

FIG 10B

FIG 10C

FIG 10D